

AMENDMENTS TO THE CLAIMS

1. (Previously Presented) A method of automatic fault diagnosis including: for each of a plurality of components of machines, carrying out the steps of: for at least one possible fault in the component: calculating for each of a plurality of symptoms for indicating a fault, a symptom value and a symptom severity value as the function of a reduced data set calculated from measured data as a measure of the deviation of the measured data from base line values; obtaining a total fault symptom strength value from the symptom value and the symptom severity value indicating the strength of the fault; and determining whether the total fault symptom strength value lies above a first predetermined value for that fault, recalling stored data relating to the total fault system strength value as a function of time, fitting the stored data to a trend line and predicting the time when the total fault symptom strength value will exceed a second predetermined value, selecting a message based on the total fault symptom strength value and the predicted time, and outputting the selected message.
2. (Original) A method according to claim 1 wherein the reduced dataset is stored in a database and the method further includes automatically taking measurements of the component when a predetermined condition occurs, calculating new reduced data, testing whether the new measurements represent a significant change on the reduced data stored in the signature database, and storing the new reduced data in the database if the step of testing indicates a significant change.

3. (Original) A method according to claim 2 wherein the method further includes classifying the operation state of the data, comparing the new reduced data with reduced data from the same operation state and storing the new reduced data in the database indexed by the operation state.
4. (Previously Presented) A method of automatic fault diagnosis for machinery having a plurality of components, based on a reduced dataset calculated from data measured on the machinery, the method comprising: for at least one machine component, and for at least one fault that may occur in that component, carrying out the steps of: calculating for each of a plurality of symptoms for indicating that fault, a symptom value and a symptom severity value as a function of the reduced dataset calculated from measured data as a measure of the deviation of the measured data from base line values; combining the symptom values and symptom severity values to give a total fault symptom strength value indicating the strength of the fault; and carrying out fault processing if the total fault symptom strength lies above a predetermined value.
5. (Original) A method according to claim 4, including classifying the operation state of the machine and recording the classification of operation state together with the measured data in the reduced dataset and calculating the symptom values from data from selected classification states.
6. (Previously Presented) A method according to claim 5 wherein in addition to a symptom value representing the relative magnitude of deviation of measured values in a operation state

from baseline values in an operation state a symptom strength representing the size of the measured values is calculated for each of the symptoms.

7. (Previously Presented) A method according to claim 4 wherein the total symptom strength of a fault is calculated from a fuzzy minimum of the system severity values and the fuzzy maximum of the symptom values.
8. (Original) A method according to claim 4 further including, if the total fault symptom strength for the fault lies below a first predetermined value, carrying out no further processing for that fault, and if the total fault symptom strength lies above the first predetermined value switching, for the fault, from a first mode in which the value of the total fault symptom strength is not recorded on an ongoing basis to a second mode in which the total fault symptom strength is recorded on an ongoing time series basis.
9. (Original) A method according to claim 4 further comprising automatically starting a routine for checking the faults of a component at regular intervals, the routine calculating the total fault symptom values, and if necessary carrying out fault processing for each of a plurality of faults that may occur in that component.
10. (Original) A method according to claim 4 wherein the reduced dataset is stored in a database and the method further includes automatically taking measurements of the component when a predetermined condition occurs, calculating new reduced data, testing whether the new measurements represent a significant

corresponding to different types of machine component and the machine component objects are specific instances of the general object class corresponding most closely to the machine component, which specific instances inherit code relating to possible faults in the type of machine component from the general object class.

14. (Original) A computer program system according to claim 11 including code for automatically taking measurements of the component, calculating new reduced data, testing whether the new measurements represent a significant change on the reduced data stored in the database, and storing the new reduced data in the database if the step of testing indicates a significant change.
15. (Original) A computer program according to claim 14 further including code for classifying the operation state of the data, comparing the new reduced data with reduced data from the same operation state and storing the new reduced data in the database indexed by the operation state.
16. (Previously Presented) A computer program system recorded on at least one data carrier including code for causing a computer system to: for a plurality of faults that may occur in one or more machine components, carrying out in turn for each in turn the steps of: calculating for each of a plurality of symptoms for indicating that fault, a symptom value and a symptom severity value as a function of data stored in a database, the data being reduced data calculated from measured data; combining the symptom value and symptom severity value to give a total fault symptom strength value indicating the strength of the fault; and

carrying out fault processing if the total fault symptom strength lies above a predetermined value.

17. (Previously Presented) A computer program according to claim 16, further comprising code for classifying the operation state of the machine and recording the classification of operation state together with the measured data in the reduced dataset.
18. (Original) A computer program according to claim 16 further including code for determining if the total fault symptom strength for the fault lies below a first predetermined value, and if so carrying out no further processing for that fault, and otherwise switching, for the fault, from a first mode in which the value of the total fault symptom strength is not recorded on an ongoing basis to a second mode in which the total fault symptom strength is recorded on an ongoing time series basis.
19. (Original) A computer program according to claim 16 further comprising code for starting a routine for checking the faults of a component at regular intervals, the routine calculating the total fault symptom value, and if necessary carrying out fault processing for each of a plurality of faults that may occur in that component.
20. (Original) A computer program according to claim 16 further including code for automatically taking measurements of the components when a predetermined condition occurs, calculating new reduced data, testing whether the new measurements represent a significant change on the reduced data stored in the signature database, and storing the new reduced data in the database if the step of testing indicates a significant change.

21. (Previously Presented) A system for automatically outputting a fault diagnosis for at least one possible fault, including code for carrying out the method of: for each of a plurality of components of machines, carrying out the steps of: for at least one possible fault in the component: calculating for each of a plurality of symptoms for indicating a fault, a symptom value and symptom severity value as the function of a reduced data set calculated from measured data as a measure of the deviation of the measured data from base line values; obtaining a total fault symptom strength value from the symptom value and symptom severity value indicating the strength of the fault stored in a database; and if the total fault symptom strength value lies above a first predetermined value for that fault, recalling stored data relating to the total fault system strength value as a function of time, fitting the stored data to a trend line and predicting the time when the total fault symptom strength value will exceed a second predetermined value, selecting a message based on the total fault symptom strength value and the predicted time, and outputting the selected message.
22. (Previously Presented) A system for automatically outputting a fault diagnosis for at least one possible fault, including code for carrying out the method of: for a plurality of faults that may occur in one or more machine components, carrying out in turn for each in turn the steps of: calculating for each of a plurality of symptoms for indicating that fault, a symptom value and a symptom severity value as a function of a reduced data set calculated from measured data as a measure of the deviation of the measured data from base line values combining the symptom

value and a symptom severity value to give a total fault symptom strength value indicating the strength of the fault; and carrying out fault processing if the total fault symptom strength lies above a predetermined value.

23. (Canceled)

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31. (Canceled)

32. (Canceled)

33. (Canceled)

34. (Canceled)

Claims 35-40 (Canceled)

41. (Previously Presented) A computer program system recorded on at least one data carrier including code for causing a computer system to carry out the steps of: for each of a plurality of

components of machines, carrying out the steps of: for at least one possible fault in the component: calculating a total fault symptom strength value from measured data, including a symptom value and the symptom severity value, indicating the strength of the fault stored in a database; and if the total fault symptom strength value lies above a first predetermined value for that fault, recalling stored data relating to the total fault system strength value as a function of time, fitting the stored data to a trend line and predicting the time when the total fault symptom strength value will exceed a second predetermined value, selecting a message based on the total fault symptom strength value and the predicted time, and outputting the selected message.